

Research Article

Hyaline cast in urine in normal healthy person

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Abstract: In the present study of outpatient setting, normal healthy male individuals were selected by the history and physical examination and urinalysis results were observed for the presence of hyaline cast. After clinical confirmation of healthy individuals in age group between 20-52 years, were selected for routine urinalysis and urine sediment was examined by unstained and stained preparation by Sternheimer-Malbin stain for the presence of hyaline cast. A total of 10% of these patients had shown hyaline cast in urine. Out of the 10 individuals, 6 had given the history of moderate to strenuous exercise. Rest of the four had not given any history of strenuous exercise, trauma or any concurrent acute and chronic illness or fever. Proteinuria of moderate to severe degree was detected by Dipstick method and heat and acetic acid method in all the cases showing the microscopic finding of hyaline cast. Microscopic hematuria was seen in 1 patient along with hyaline cast given the history of severe strenuous exercise 48 hours back. Demographic data collected were age, weight, family history of any renal disease.

Keywords: Urine, Hyaline cast, Sternheimer-Malbin stain.

1. Analytical Parameters

The following pre-analytical parameters were taken into the account:

1. Adherence to laboratory protocol using the same
2. Supplies
3. Sequences of procedural steps
4. Timing intervals
5. Equipment
6. Ensures accuracy and precision of microscopic analysis of urine sediment

2. Materials and Methods

The study was carried out during January 2015 to July 2015, in R.D. Gardi Medical College Ujjain; in the department of pathology. 100 male normal healthy individuals were subjected for the urinalysis for the presence of hyaline cast.

2.1 Collection of Urine Sample

Verbal clear instructions were given to all the individuals regarding the proper collection of urine.

Fresh clean-catch first morning mid-stream sample was collected in the urine container without any preservatives in the laboratory itself.

2.2 Exclusion Criteria for Rejection of Sample

Samples brought from home were not included in the study.

2.3 Time to Process the Sample

In all cases, it was done within 30 minutes after collection.

2.4 Specimen Preparation

12ml of freshly voided well-mixed urine sample was centrifuged in 15ml glass conical tube at 450rpm for 5 minutes. 11ml of urine was transferred to another tube for routine chemical testing by DIPSTICK method and Heat and acetic method for detection of protein.

1ml of remaining urine was resuspended in the same tube (12:1 concentration).

2.5 Slide Preparation

Slide was labeled on the frosted end with patient's name, date, and accession number.

Each slide was divided by glass marking pencil into two parts. Out of the last two drops from the

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centrifuge tube, one drop of unstained sediment was transferred to one side of the slide. In the centrifuge tube having last one drop of sediment, a drop of Sternheimer stain was added for 1 minute to stain the cast. Now the last drop of stained sediment was transferred to the second portion of the slide. On each drop of the sediment, a coverslip of 22x22mm was added. Care was taken to avoid the formation of air bubbles.

2.6 Examination of Slide

Slide was first scan along the edges of the coverslip under low power (100X objectives) and then under high power (400X) for minute details. Examination was done under subdued light because hyaline cast has low refractive index. Under low power, 10 fields were examined in each smear preparation. Other urine microscopic abnormalities were also taken into account.

2.7 Appearance of unstained hyaline cast

Unstained hyaline cast was diagnosed by its smooth texture and a refractive index close to the surrounding fluid under reduced light with low condenser.

2.8 Appearance of Hyaline cast by Sternheimer-Malbin stain

It was detected by its characteristics pink to red color.

2.9 Reporting of Slide

Report was prepared by counting the number of hyaline cast per LPF by scanning 10 microscopic fields.

3. Observation and Result

A total of 100 individuals were included in the present study for analysis.

| Age | Number | Percentage | +ve hyaline cast | Number / LPF |
|-------|--------|------------|------------------|-------------------|
| 20-30 | 60 | 60 | 06 | 3-5 / LPF |
| 31-41 | 20 | 20 | 02 | 1-2 / LPF |
| 42-52 | 20 | 20 | 02 | Occasional to one |

A total number of six normal individuals between the age group of 20-30 years had shown the hyaline cast in moderate number ranging from 3-5 in their urine. In the above age group showing positive results for cast had given the history of moderate to severe exercise 1-5 days prior to test result (100%). Two individuals between the age group (31-41 years) had shown 1-2 casts under LPF comprising 20%. Two individuals in age group of 42-52 years had shown occasionally to one cast in 10 per LPF objective constituting another 20%.

4. Discussion

Hyaline cast is the most common type of cast that is solidified Tamm-Horsfall mucoprotein secreted from

the tubular epithelial cells of individual nephrons. Hyaline cast entirely formed from low molecular weight protein Tamm-Horsfall protein, having varied morphology: normal parallel sides with rounded ends, cylindroids, wrinkled, convoluted colorless appearance. Low urine flow, concentrated urine, or an acidic environment can contribute to the formation of hyaline cast. It can be missed on cursory review under bright field microscopy or on an aged sample where dissolution has occurred it is best seen under phase contrast microscopy: It will enhance visualization Stain of choice is Sternheimer-Malbin stain which imparts pink color to cast. Following are the main Causes of hyaline cast in urine:

a. Non-pathological cause

- Fever
- Stress
- Strenuous exercise
- Dehydration
- Heat stroke

b. Pathological cause

- Acute glomerulonephritis
- Pyelonephritis
- Chronic renal disease
- Congestive heart failure
- Overflow proteinuria (multiple myeloma)

5. Conclusion

Hyaline cast is not a common finding in normal healthy persons. But it can be seen in young adults after moderate to strenuous exercise which may lead to dehydration, and in fever without any clinical disease. It is the most common cast seen in normal individuals. 0-2 per LPF saw in normal persons, but their number may increase massively within 24 hours following intense physical exertion. Hyaline casts are the classic prototype of all urinary casts. When present in low number 1-3 hyaline casts are not always indicative of clinically significant renal disease.

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